MEMOIRS OF THE ROYAL SOCIETY OF NAPLES.[1]

THE greater number of the papers published in the last volume of the *Atti* of the Royal Society of Naples deal with geological and palæontological subjects connected with southern Italy. Dr. Maria Pasquale has prepared a catalogue of the fossil remains of Selachians, preserved with the University collections in Naples, and in various other museums in Italy. The majority of the species were already known through the writings of Prof. O. G. Costa,

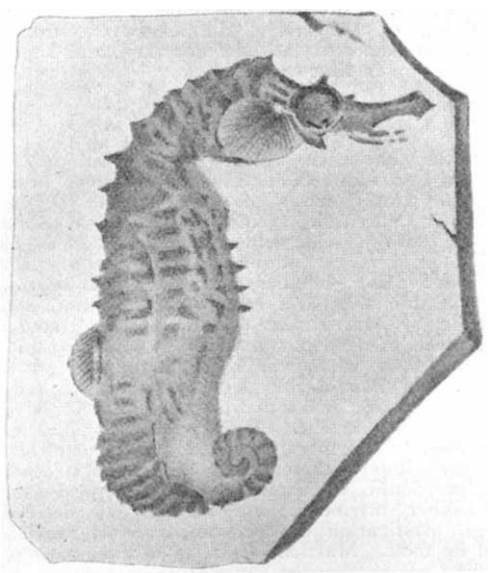

FIG. 1.—*Hippocampus antiquorum*. From the Pleistocene Clay of Taranto.

who had originally formed the Neapolitan collection, and of Prof. Bassani, in whose custody the specimens now are. With the exception of one possibly Cretaceous species, all are Cainozoic, and no less than twenty-two species come from the *pietra leccese* (Middle Miocene).

The fish fauna of the Pleistocene Clays of Taranto is described by Prof. F. Bassani (No. 3, 59 pp., 3 pls.), principally from a collection of 700 specimens obtained by Dr. Marchesetti during the excavation of a new dry dock at Taranto in 1886. From beds of clay varying from 10 metres to 73 metres in thickness come 9 species of algæ, including the new *Grateloupia bassanii*, which form the subject of a special memoir by Dr. A. de Gasparis (No. 4, 8 pp., 1 pl.), and 29 species of fish, all of which are found living in the Mediterranean at the present day, and many of which may be seen on the stalls of the fish market in Taranto. Certain genera, Hippocampus, Scopelus, Maurolicus, Heliastes, Mullus, and Trachypterus, do not appear to have been recorded in the fossil state before these Tarantine discoveries. The occurrence of many individuals belonging to near-shore-living genera, like Solea, suggests that the fauna was essentially a littoral one, and the presence of such deep-sea types as Nyctophus (=Scopelus) or Maurolicus is hardly to be regarded in any other light than the occasional upheaval of the *dead* bodies of abyssal forms in the Straits of Messina at the present day. Bones of a dolphin are recorded from the same deposits.

[1] "Atti della Reale Accademia delle scienze fisiche e matematiche di Napoli." Vol. xii. (1905.)

Dr. M. Pasquale also contributes a short illustrated description of another fish, *Palaeorhynchus deshayesi*, Agassiz, from the Eocene deposits near Barberino di Mugello, Florence (No. 8, 7 pp., 1 pl.).

Two important contributions to the palæontology of the Gulf of Naples deal with the corals of Capri and with the Triassic shells of Giffoni, near Salerno. Prof. de Angelis d'Ossat has proved that the Capri limestones of Venassino, which have hitherto been generally believed to be of Tithonic age, in accordance with the view of Oppenheim (1889), are far more nearly related in their coral-fauna to the Urgonian rocks. Out of a total of 25 species of corals, 18 are shared with the Urgonian, only 1 with Tithonic deposits. Several species of Amphiastræid and Astræid corals are described and figured as new to science, and an Acanthocœnia is named after Dr. Cerio, the discoverer of this rich deposit, who has devoted so much of his life to the study of the natural history of Capri. The dolomitic limestone of Giffoni has already been made known by the work of Costa and Bassani on the fish-fauna. In Dr. Galdieri's memoir (No. 16, 30 pp., 1 pl., 21 figs.), which is in the main a revision of O. G. Costa's work of forty years ago, an attempt has been made to determine the exact chronological position of the Giffoni beds with respect to others both in Italy and the Alps. More material will be required before certain conclusions can be drawn, but at the present state of knowledge there is fair evidence of contemporaneity with the well known Triassic strata at St. Cassian.

An interesting note bearing on the same general subject of the limestones of the Bay of Naples is on the Scoglio di Revigliano, by Prof. de Lorenzo (No. 12, 4 pp., 2 pls.). Revigliano Island is a tiny islet rock of Cretaceous, perhaps of Urgonian, age, which, were the sea to be removed, would be seen to rise by itself from a gently sloping plain of volcanic deposits, among which pumice, like that which buried Pompeii in the year 79, would be conspicuous, as well as the products of other Vesuvian and Campanian eruptions. The strata of the little rock dip in the same direction as those of the Sorrentine peninsula, viz. to the north-west, and they indicate by their trend the existence of a great fault, all other trace of which is buried beneath the alluvial and volcanic deposits of the Sarno-Castellamare plain.

The granitoid and Filonian Rocks of Sardinia form the subject of a posthumous memoir of Carlo Riva (No. 9, 108 pp., 7 pls.), which has been prepared for the press by his friend and colleague Prof. de Lorenzo. After describing the petrographical characteristics of the chief varieties of rock in detail, the author gives a valuable account of seventeen localities in Sardinia where zones of contact between the granites and schists and calcareous rocks may be well studied, together with an appreciation of the metamorphic changes that have taken place at each locality. The memoir concludes with a discussion of the theories of the probable age of the granitoid rocks of Sardinia.

FIG. 2.—Revigliano from the south-east.

Dr. V. Bianchi has re-investigated certain parts of the brain of *Delphinus delphis* (No. 14, 16 pp., 3 pls.), and has compiled an interesting table setting forth his estimates of the relative numbers of neuroglœal corpuscles and of nerve cells in various regions of the cerebral cortex.

Although the cerebral hemispheres resemble those of the carnivorous type, yet the frontal lobes are so singularly under-developed that the author finds therein an explanation of the relative stupidity of the dolphin.

"Bidder's Organ" (Spengel) was discovered in 1758 by Rösel von Rosenhof upon the testes of *Bufo calamita*. Dr. Attilio Cerruti, by means of material captured in the volcanic crater of Archiagnano, near Naples, has been able to demonstrate a highly interesting cytological process which occurs in the male individuals of *Bufo vulgaris* during the early months of the year. Certain of the cells, named ovules, of the organ of Bidder are so strongly attracted by some of their neighbours that they actually penetrate their enveloping membranes, and their cytoplasm and nuclei flow into the invaded cells. In the majority of cases the penetration is simple, *i.e.* only one ovule invades a second, but multiple penetration has also been observed; and then in the case of ovules, say, *a*, *b*, *c*, *d*, ovule *a* will penetrate into *b*, *b* into *c*, *c* into *d*, &c. In all cases of penetration, degeneration ensues. Generally speaking, the invading ovule is the younger, and is one which has developed on the periphery of the organ, the invaded ovules lying nearer the centre. The author draws a suggestive comparison between this phenomenon and that of the fusion of Ascaris ova described by O. zur Strassen, which, if they develop at all, give rise to monsters.

There are also four mathematical memoirs. Signor D. de Francesco contributes a paper on the motion of a cord and on the equilibrium of a flexible but non-extensible surface (Nos. 5 and 6, 5 pp., 9 pp.), and Prof. E. Cesàro investigates the intrinsic representation of a surface (No. 7, 20 pp.) and the curve of von Koch (No. 15, 12 pp.). A lengthy contribution to the theory of ternary biquadratic form and its resolution into factors (No. 13, 102 pp.) is by the hand of Ernesto Pascal.

R. T. G.

PHYSIOLOGICAL ECONOMY IN NUTRITION.

ONE of the most remarkable points in the recent history of physiological research is the small amount of attention bestowed upon the important question of nitrogenous metabolism until within the last few years. The older work of Voit and of Pflüger has for long been regarded as authoritative, in spite of the fact that these two observers are not at one on many essential facts. They, however, agree that proteid food is a most essential constituent of our diet, and that a minimum allowance per diem of about 100 grams, corresponding to 16 to 18 grams of nitrogen, is necessary for the well-being and equilibrium of the average adult human individual. A dietary containing this amount of proteid or albuminous material would not be regarded by the average meat-eating Englishman to be a very liberal one, and is frequently exceeded.

So firmly rooted has this idea of a proteid minimum intake of 100 grams become that not only is it stated as an axiom in the majority of text-books, but it forms the basis of dietaries prescribed by responsible Governments for use on military service, &c. The doctrine that proteid food is the most necessary of all foods is so thoroughly ingrained, even upon the lay public, that in popular parlance the words nutritious and nitrogenous are almost synonymous. This is a very dangerous mistake, for the non-nitrogenous constituents of diet, the carbohydrates and the fats, are equally necessary for the maintenance of bodily heat and energy, and so are equally, though in a somewhat different sense, to be regarded as nutritious. An example of this erroneous way of regarding food is to be seen in advertisements that meet the eye everywhere; preparations of milk, for instance, are sold which contain mainly the proteid matter of that fluid, and are vaunted as containing all the nutritious elements, the other constituents being looked upon as useless. As a matter of fact, milk is of special value on account of the admixture of the non-proteid with proteid material. In the concentration camps which were established during the later phases of the South African War, such hardships as occurred there were mainly due, not to lack of proteid nutriment, for the standard of nitrogen was fully maintained, but to lack or scarcity of vegetables and other sources of carbohydrate food.

For some considerable time, certain experimenters in Germany have striven to demolish the fetish of the irreducible minimum of the 16 or 18 daily grams of nitrogen, but their work has not attracted world-wide acknowledgment; the experiments they recorded were either made for too short a time or on too few people to be regarded as epoch-making.

It has been left to America to make the question one of immediate and urgent attention, and I propose in this article to bring the conclusions of these American investigators before the readers of NATURE.

Prof. R. H. Chittenden, of Yale University, and Dr. Otto Folin, of Waverley, Massachusetts, are the two principal exponents of the new doctrine, and I propose to deal with them in that order.

The Work of Chittenden.

Chittenden has been working at the subject for some years, and the results of his labours are given in a volume which will amply repay perusal entitled "Physiological Economy in Nutrition" (New York: F. A. Stokes Co., 1904). A more popular exposition of his ideas has been published in a recent number of the *Century Illustrated Monthly Magazine* (October, 1905, p. 859 *et seq.*).

The question was first brought to the notice of Prof. Chittenden by Mr. Horace Fletcher, who states that he cured himself of dyspeptic troubles by lessening his proteid nutriment below what was regarded as the physiological standard. He has started a propaganda on the subject from the economic point of view, for proteid is the most expensive of the articles of diet. One at once sees that the question is not merely one for the student of science, but is most important for the man in the street as well. Owing, no doubt, to his lack of physiological knowledge, Mr. Fletcher attributed the benefits he derived to a thorough mastication of the comparatively small amount of food he took. Mastication is, of course, of importance, but it does not possess the superlative importance attributed to it by Mr. Fletcher, and will not explain the results of the experiments made by Chittenden and his fellow-workers.

The number to which I have already alluded (16 to 18 grams of nitrogen a day) is based roughly on the usual diet of the meat-eating nations, and it is argued that habit and instinct alike are safe guides in determining such a number, and the effects of such a diet in the maintenance of health and bodily equilibrium have been abundantly proved through centuries of experience. It forms, as already stated, the basis of the usually accepted dietaries of Ranke and of Voit.

In other nationalities, it is true, a different figure has been arrived at, and the same argument of habit and experience might equally well be used in its favour. Thus in certain semi-civilised races the proportion of flesh food is much larger, and in other races, again—and this is the commoner variation—the proteid intake is less. We need, however, only consider the second alternative, for one can hardly suppose anyone will advocate a return to more carnivorous habits. It is alleged that in such nationalities as the Japanese, or in groups of people like vegetarians, and in certain rural populations, health and equilibrium are as well maintained as in the ordinary meat-eating inhabitants of our large cities. Those who hold that the number 16 to 18 is the correct one have explained the different number arrived at by the nations of the Far East as a racial difference propagated by long centuries of inheritance, or have tried, more or less successfully, to show that such people come nearer to Voit's standard than had been supposed, or else that they are not properly nourished.

Such explanations will not hold water when applied to the experiments conducted by Prof. Chittenden upon himself, his colleagues, his students, and upon a considerable number of athletes and soldiers. These experiments lasted in all cases for months, and in some for more than a year. The proteid intake was reduced to half, and in some cases to less than half the number hitherto regarded as normal. After a variable initial drop in body-weight, the deprivation was apparently followed by no untoward results. Equilibrium was maintained; the health remained